

a flared tube end, said flared end having an annular surface;
a compression washer for interfacing axially with said flared end; and
a compression fitting having a threaded portion for urging said flared tube end into axial compression against said compression washer.

77. (Cancelled) The fitting of claim 76, wherein said compression washer is formed of an elastomer.

REMARKS

This is intended as a full and complete response to the Office Action dated December 19, 2002, having a shortened statutory period for response set to expire on March 19, 2003. Please reconsider the claims pending in the application for reasons discussed below.

The Examiner has restricted the claims to the following Groups:

Group I, claim(s) 1-75, drawn to a chemical control system and method for using the chemical control system; and

Group II, claim(s) 76 and 77, drawn to a fitting for coupling tubing.

In response to the Examiner's restriction, Applicants hereby elect Group I, claims 1-75 for prosecution in the instant case.

Claim 9 stands objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Further, Claim 9 stands rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicant has cancelled claim 9, and therefore, withdrawal of the rejection is respectfully requested. As noted above, Applicants have cancelled claims 76 and 77 from consideration.

Claims 1, 5 and 9 stand rejected under 35 U.S.C. 102(b) as being anticipated by *Gaspar* (U.S. Patent No. 4,631,530). The Examiner has taken the position that *Gaspar*

teaches each and every element/limitation recited in claims 1, 5, and 9. Applicant traverses the rejection and respectfully submits that *Gasper* fails to teach each and every limitation recited in Applicant's claims.

Gasper teaches a chemical process monitor for a water treatment process. The chemical process monitor broadly includes an adjustment means, a control means, and a monitoring means. The control means is configured to sense a chemical process parameter of the process stream 10, which is defined as the pH and/or ionic conductivity of the stream 10. (See Column 4, lines 41-45 and Column 5, lines 30-33) However, *Gasper* does not teach an analyzer capable of determining a proportion of a chemical constituent in a chemical solution, as recited in independent claim 1. Further, claim 5 (which depends from claim 3) recites a reaction cell for receiving a sample of the chemical solution from said precision analyzer sample delivery arrangement and a sensor for measuring a predetermined characteristic of the chemical solution and the progress of a reaction with the chemical solution. *Gasper* fails to teach both the reaction cell and the sensor measuring a characteristic and *progress* of a reaction. *Gasper* merely measures the pH and/or ionic conductivity, and therefore, does not measure progress of the reaction. Therefore, Applicant respectfully submits that *Gasper* fails to teach the limitations recited in claims 1, 5, and 9, and as such, reconsideration of the rejection is respectfully requested.

Claims 1-3, 5, 7 and 9 stand rejected under 35 U.S.C. 102(b) as being anticipated by *Ishikawa* (U.S. Patent No. 4,203,156). The Examiner takes the position that *Ishikawa* teaches each and every limitation in claims 1-3, 5, 7, and 9. Applicants traverse the rejection and respectfully submit that the claims recite subject matter not disclosed or otherwise taught by *Ishikawa*.

Lshikawa teaches a control means for a titration process. The control means is described as being able to control various aspects of a titration process, including the flow of the titrant to the reaction chamber, the electrodes, endpoint detection, and other parameters directly involved with the titration measurement process. However, *Ishikawa* does not teach a replenisher responsive to a controller for dispensing a controlled quantity of a predetermined chemical constituent, as recited in claim 1. This

limitation recited in Applicant's claim represents the constituent measured by a titration process, which is then replenished in the bulk solution from which the sample was taken for measurement. *Ishikawa* deals with the titration process control, but does not teach using the measurement from the titration process to operate a replenisher, as recited in claim 1. Therefore, Applicants submit that claim 1, along with claims 2-3, 5, 7, and 9 that depend therefrom, recite subject matter that is not taught by *Ishikawa*, and as such, reconsideration of the rejection is respectfully requested.

Claims 1-7 and 9 stand rejected under 35 U.S.C. 102(b) as being anticipated by *Onofusa* (U.S. Patent No. 5,186,895). The Examiner takes the position that *Onofusa* teaches each and every limitation in claims 1-7, and 9. Applicants traverse the rejection and respectfully submit that the claims recite subject matter not disclosed or otherwise taught by *Onofusa*.

Onofusa teaches an apparatus for automated time dependent analysis of a fluid composition. The primary components of the apparatus, as illustrated in Figure 1, are a receptacle C-2, a potentiometer E, a heater H, motors and solenoids M-1 through M-5, a commercial dispenser P-1, pumps P1 through P-5, valves V-1 through V-4, an ORP electrode, and a treating beaker R. (See Column 5, lines 14-29) However, although *Onofusa* teaches a measuring device capable of measuring the concentration of a constituent in a solution, *Onofusa* does not teach a replenisher, as recited in claim 1. Applicants note that the Examiner takes the position that the commercial dispenser P-2 of *Onofusa* is equivalent to Applicants claimed replenisher, however, Applicants respectfully submit that a careful reading of the *Onofusa* specification, and in particular columns 13, lines 50-60 and column 17, lines 11-24, indicates that the *Onofusa* commercial dispenser P-2 is not equivalent to Applicant's replenisher as claimed. As such, reconsideration of the rejection of claims 1-7 and 9 over *Onofusa* is respectfully requested.

Claims 1-9 stand rejected under 35 U.S.C. 102(b) as being anticipated by *Becket* (U.S. Patent No. 5,389,546). The Examiner takes the position that *Becket* teaches each and every limitation in claims 1-9. Applicants traverse the rejection and respectfully submit that the claims recite subject matter not disclosed or otherwise taught by *Becket*.

Becket teaches a method for monitoring constituent concentration in a metal working fluid solution. In similar fashion to Applicant's remarks with respect to the *Onofusa* reference, Applicant submits that *Becket* fails to teach Applicants claimed replenisher. Specifically, the Examiner takes the position that *Becket* teaches the replenisher via element 28 in *Becket*. However, the specification of *Becket* describes element 28 as a peristaltic pump (See column 10, lines 20-68) that functions to supply titrant, and in particular aqueous hydrochloric acid, from the reservoir 38 to the reaction cell. (See column 11, lines 1 – 40) *Becket* does not in any way describe pump 28 as being a replenisher, nor does the specification of *Becket* describe pump 28 as being configured to replenish the measured constituent in the bath from which the measured sample was taken, as recited in claim 1. Therefore, Applicant submits that *Becket* fails to teach each and every claimed element, and as such, reconsideration of the rejection is respectfully requested.

Claims 1-6, 9-18, 22-52, 55-59, 62 and 63 stand rejected under 35 U.S.C. 102(b) as being anticipated by *Sakisako*. (U.S. Patent No. 4,749,552). The Examiner takes the position that *Sakisako* teaches each and every limitation in the rejected claims. Applicants traverse the rejection and respectfully submit that the claims recite subject matter not disclosed or otherwise taught by *Sakisako*.

Sakisako teaches an automatic titration apparatus for measuring the density of a liquid. The *Sakisako* apparatus is automated, and therefore, includes a controller configured to monitor and regulate the operation of the apparatus. The apparatus further includes a sampling mechanism, an analysis mechanism, and a mechanism for feeding back the measurement results to regulate the density of the etching liquid being measured. However, *Sakisako* does not expressly teach a replenisher, as recited in claim 1. Further, *Sakisako* does not teach the purge system recited in claim 1. More particularly, the purge system recited in claim 1 is described in Applicant's specification as cleaning not only the reaction beaker, but also the sample delivery line leading to the reaction beaker, which generates more accurate results, as the sample being measured is pure and not contaminated by elements from the previous sample that may have remained in the sample delivery line. Therefore, Applicants submit that *Sakisako* fails to teach each and every limitation recited in claim 1, and as such, reconsideration of the

rejection of claim 1 and dependent claims 2-6, 9-18, and 22-27 is respectfully requested. Similarly, claim 27 recited the same purge system, and as such, Applicants submit that *Sakisako* also fails to teach each and every element recited in claim 27, and dependent claims 28-37, and as such, reconsideration of the rejection of these claims is also respectfully requested.

With regard to claims 37-52, 55-59, 62 and 63, Applicants submit that *Sakisako* fails to teach the recited method steps of Applicant's claim. More particularly, *Sakisako* does not disclose controlling a syringe to deliver titrant to the chemical reaction beaker, as recited in independent claim 38. Further, *Sakisako* does not teach conducting the cleanup procedure recited in claim 38, which includes cleaning the reaction beaker and the sample delivery supply line. *Sakisako* teaches rinsing the reaction cell with more solution to be analyzed, which is not equivalent to Applicant's claim, and then rinsing the cell with water. Further, *Sakisako* does not in any way teach cleaning or purging the sample delivery line, which is part of Applicant's cleaning process and is expressly claimed in claim 43. As such, Applicants respectfully request reconsideration of the rejection of claims 37-52, 55-59, 62 and 63 over *Sakisako*.

Claims 68, 69 and 73-75 stand rejected under 35 U.S.C. 102(b) as being anticipated by *Entwistle* (U.S. Patent No. 4,668,346). The Examiner takes the position that *Entwistle* teaches each and every limitation in the rejected claims. Applicants traverse the rejection and respectfully submit that the claims recite subject matter not disclosed or otherwise taught by *Entwistle*.

Entwistle teaches a method for conducting an ion concentration analysis using standard addition techniques. The method of *Entwistle*, as indicated by the Examiner, generally includes filling a cell with a solution doped with the ion to be measured, adding a standard solution, recording an electrode potential change, adding more sample to the analysis and recording a new potential, and calculating the results of the analysis using simple addition techniques. However, *Entwistle* does not teach determining the results of the ion potential measurements via extrapolation, as recited in claim 68. Rather, *Entwistle* teaches using an addition technique, which is distinct from Applicant's extrapolation technique. As such, Applicants request reconsideration of the rejection of

claim 68, along with dependent claims 69, and 73-75 over *Entwistle*.

Claims 19-21 stand rejected under 35 U.S.C. 103(a) as being unpatentable over *Sakisako* and further in view of *Suthergreen*. (U.S. Patent No. 5,351,725). The Examiner has taken the position that the combination of references teaches each and every limitation recited in claims 19-21. Applicants traverse the rejection and respectfully submit that claims 19-21 recite subject matter that is neither disclosed, taught, nor suggested by the cited combination of prior art references.

Sakisako is discussed above. *Suthergreen* teaches a system for monitoring tank liquid filling process. However, *Suthergreen* does not teach a replenisher, as recited in claim 1, the independent claim from which claim 19 depends. Further, *Suthergreen* does not teach the purge system recited in claim 1, the independent claim from which claim 19 depends. More particularly, the purge system recited in claim 1 is described in Applicant's specification as cleaning not only the reaction beaker, but also the sample delivery line leading to the reaction beaker, which generates more accurate results, as the sample being measured is pure and not contaminated by elements from the previous sample that may have remained in the sample delivery line. Therefore, Applicant submits that *Suthergreen* fails to supplement the teaching of *Sakisako* such that the combination of references teaches each and every limitation recited in Applicants claims. As such, reconsideration of the rejection is respectfully requested.

Claims 53, 54, 60, and 61 stand rejected under 35 U.S.C. 103(a) as being unpatentable over *Sakisako*. As note above, Applicants submit that *Sakisako* fails to teach the replenisher and the cleaner recited in Applicant's claims. Therefore, reconsideration of the rejection is requested, as the reference fails to teach, show, or suggest each and every claimed limitation.

Claims 8, 64, and 67 stand rejected under 35 U.S.C. 103(a) as being unpatentable over *Sakisako* and further in view of *Janzen* (U.S. Patent No. 4,095,272). The Examiner has taken the position that the combination of references teaches each and every limitation recited in claims 8, 64, and 67. Applicants traverse the rejection and respectfully submit that claims 8, 64, and 67 recite subject matter that is neither disclosed, taught, nor suggested by the cited combination of prior art references.

Sakisako is discussed above. *Janzen* teaches automatic turbidimetric titration. However, does not teach the purge system recited in claim 1, the independent claims from which claims 8, 64, and 67 depends. More particularly, the purge system recited in claim 1 is described in Applicant's specification as cleaning not only the reaction beaker, but also the sample delivery line leading to the reaction beaker, which generates more accurate results, as the sample being measured is pure and not contaminated by elements from the previous sample that may be have remained in the sample delivery line. Therefore, Applicant submits that *Janzen* fails to supplement the teaching of *Sakisako* such that the combination of references teaches each and every limitation recited in Applicants claims. As such, reconsideration of the rejection is respectfully requested.

Claims 65 and 66 stand rejected under 35 U.S.C. 103(a) as being unpatentable over *Sakisako* and *Janzen* and further in view of *Nagy, et al.* (U.S. Patent No. 4,120,657). In similar fashion to the rejection of claims 8, 64 and 67 immediately above, Applicants submit that *Nagy* fails to further the teaching of *Sakisako* and *Janzen* to the level necessary to support an obviousness rejection, *i.e.*, *Nagy* also doesn't teach the replenisher or the purge/clean apparatus of the invention. As such, reconsideration of the rejection is respectfully requested.

Claims 70-72 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Entwistle. Applicants respectfully traverse the rejection. Entwistle is discussed above. Applicants submit that Entwistle fails to disclose the extrapolation method recited in claim 68, the independent claim from which claims 70-72 depend. As such, reconsideration of the rejection is respectfully requested.

In conclusion, the references cited by the Examiner, neither alone nor in combination, teach, show, or suggest the method or apparatus of the present invention. Having addressed all issues set out in the office action, Applicants respectfully submit that the claims are in condition for allowance and respectfully request that the claims be allowed.

The prior art made of record is noted. However, it is believed that the secondary references are no more pertinent to the Applicants' disclosure than the primary references cited in the office action. Therefore, it is believed that a detailed discussion

of the secondary references is not deemed necessary for a full and complete response to this office action. Accordingly, allowance of the claims is respectfully requested.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

1. (Amended) A bath chemical control system for a chemical mechanical planarization system, [solution having predetermined chemical constituents, the chemical control system] comprising:

an analyzer [for] configured to determine [ing] the proportion of one of the predetermined chemical constituents in the chemical solution to be delivered;

a precision analyzer sample delivery arrangement for delivering to said analyzer a sample of the chemical solution;

a controller for receiving information relative to the determination by said analyzer of the proportion of one of the predetermined chemical constituents in the chemical solution to be delivered; [and]

a replenisher responsive to said controller for dispensing a controlled quantity of the predetermined chemical constituent; and

a purge system for clearing said analyzer and said delivery arrangement.

2. (Amended) The chemical bath control system of claim 1, wherein said analyzer is a titrator system.

3. (Amended) The chemical bath control system of claim 1, wherein said analyzer comprises:

a reaction cell for receiving a sample of the chemical solution from said precision analyzer sample delivery arrangement; and

a sensor for measuring [selectably] a predetermined characteristic of the chemical solution and the progress of a reaction with the chemical solution.

4. (Amended) The chemical bath control system of claim 3, wherein said reaction cell comprises a glass beaker.

5. (Amended) The chemical bath control system of claim 3, wherein said sensor comprises a pH electrode.

6. (Amended) The chemical bath control system of claim 3, wherein said sensor comprises a ORP electrode.
7. (Amended) The chemical bath control system of claim 3, wherein said sensor comprises an ion selective electrode.
8. (Amended) The chemical bath control system of claim 3, wherein said sensor comprises a turbidity sensor.
10. (Amended) The chemical bath control system of claim 1, wherein there is further provided a global loop for distributing the chemical solution.
11. (Amended) The chemical bath control system of claim 1, wherein said controller is provided with a display for displaying information responsive to the determination made by said analyzer.
12. (Amended) The chemical bath control system of claim 11, wherein said display displays information responsive to a plurality of predetermined parameters of the chemical control system.
13. (Amended) The chemical bath control system of claim 11, wherein said display displays information responsive to a diagnostic condition of the chemical control system.
14. (Amended) The chemical bath control system of claim 11, wherein said display displays information responsive to a history of replenishment operations by said replenisher.
15. (Amended) The chemical bath control system of claim 11, wherein said display displays information responsive to a history of system faults.
16. (Amended) The chemical bath control system of claim 11, wherein there is further

provided a chemical sensor, and said display displays information responsive to the calibration of said chemical sensor.

17. (Amended) The chemical bath control system of claim 11, wherein there is further provided a chemical tank, and said display displays information responsive to the amount of the chemical solution in said chemical tank.

18. (Amended) The chemical bath control system of claim 17, wherein there is further provided a liquid level monitoring arrangement coupled between said chemical tank and said controller.

19. (Amended) The chemical bath control system of claim 18, wherein said liquid level monitoring arrangement comprises a pressure monitoring system for measuring the pressure of a monitoring gas that is delivered to said chemical tank by way of a pressure regulator and orifices, monitoring being effected in a flow region past said orifices within an inert tube that extends into said tank so as to be immersed

20. (Amended) The chemical bath control system of claim 19, wherein the pressure of a monitoring gas that is delivered to said liquid level monitoring arrangement prior to said orifice is approximately between 1 and 15 psi.

21. (Amended) The chemical bath control system of claim 20, wherein the pressure of a monitoring gas that is delivered to said liquid level monitoring arrangement is preferably between 2 and 10 psi.

22. (Amended) The chemical control system of claim 1, wherein said precision analyzer sample delivery arrangement comprises an eductor for drawing a sample to said analyzer.

24. (Amended) The chemical bath control system of claim 1 [23], wherein said purge system comprises a gas purge valve for controlling a pressurized purge gas for clearing

said analyzer.

25. (Amended) The chemical bath control system of claim 24, wherein said purge system additionally comprises a rinse solvent purge valve for controlling a rinse solvent for clearing said analyzer.

26. (Amended) The chemical bath [delivery] control system of claim 25, wherein actuation of said rinse solvent purge valve additionally clears an analyzer plumbing associated with said analyzer and said gas purge valve.

27. (Amended) A chemical bath control system for a chemical solution having a predetermined chemical constituent, the chemical control system comprising:

a precision analyzer sample delivery arrangement for delivering a precise sample of the chemical solution;

a reaction cell for receiving the precise sample of the chemical solution;

a precision analyzer reagent delivery arrangement for delivering a precise quantum of a predetermined reagent to said reaction cell;

a sensor for measuring a characteristic of the chemical solution;

a controller for receiving information relative to the characteristic of the chemical solution measured by said sensor; [and]

a replenisher responsive to said controller for receiving a controlled quantity of the predetermined chemical constituent;

a purge system for clearing said analyzer and said delivery arrangement.

28. (Amended) The chemical bath control system of claim 27, wherein there is further provided a second sensor for detecting the availability of the chemical solution.

29. (Amended) The chemical bath control system of claim 28, wherein said second sensor comprises a proximity sensor.

30. (Amended) The chemical bath control system of claim 27, wherein said precision

analyzer sample delivery arrangement comprises a syringe.

31. (Amended) The chemical bath control system of claim 30, wherein there is further provided a controllable drive arrangement for driving said syringe.

32. (Amended) The chemical bath control system of claim 31, wherein said controllable drive arrangement comprises a stepper motor drive.

33. (Amended) The chemical bath control system of claim 27, wherein said replenisher is arranged to deliver the controlled quantity of the predetermined chemical constituent to a storage tank of the chemical solution.

34. (Amended) The chemical bath control system of claim 27, wherein there is further provided a cleanup arrangement for clearing said reaction cell of a prior sample of the chemical solution.

35. (Amended) The chemical bath control system of claim 34, wherein said cleanup arrangement comprises a purge gas.

36. (Amended) The chemical bath control system of claim 35, wherein said cleanup arrangement comprises a rinse solvent.

37. (Amended) The chemical bath control system of claim 34, wherein said cleanup arrangement comprises a syringe cycling arrangement for cycling a sample syringe until it is cleared of a prior sample.